EXPLORATION OF THE LLOYD GEORGE MOUNTAINS IN THE NORTHERN CANADIAN ROCKIES

By Dr. N. E. ODELL

AN Anglo-Canadian-American expedition, sponsored by F. S. Smyth, and consisting of seven members, was able during the past summer (1947) to carry out the exploration of the Lloyd George Mountains, which are situated in northern British Columbia. This mountain group lies just south of lat. 58° N., and only the foothill district to the south of it had previously been visited. The name Lloyd George Mountains, in honour of the late British premier, was given in 1916 by P. L. Haworth, who made a difficult journey to the lake, now named after him. It was Haworth Lake, fed by the melt-waters draining the Lloyd George Icefield, which was utilized by this year's expedition as a base.

We were an airborne expedition, and flew in a sea-plane in two parties, from a take-off some 250 miles to the southward. A reconnaissance flight was made from Haworth Lake (altitude *c.* 3,800 ft.) before the departure of the aircraft, and this revealed a vast snowy range lying to the north-west as well as the south-east of the contiguous Lloyd George Group. It is a highly complicated and deeply dissected mountain region, with the highest peaks approaching 10,000 ft. in elevation. The eastward flowing Liard River, bounding this belt of mountains on the north, would seem to form the true northern limit of the Rocky Mountains proper, as originally suggested by R. G. McConnell and again recently by M. Y. Willams[1].

The dominating physiographic feature, from which rise the highest peaks, all of which were ascended, is the Lloyd George Icefield, and its main *névé* covers some 45 sq. miles, but with dependent glaciers it is 90–100 sq. miles in total extent. Steep glaciers descend to an altitude of 4,000 ft. in heavily forested valleys, which are the haunt of bear, deer and other game. A very rich and beautiful alpine flora was found, particularly in July, up to an elevation of 7,000 ft. and more. More than two hundred species were collected, some believed new, and these were sent for determination to the Royal Botanic Garden, Edinburgh. The flora was quite as profuse as hundreds of miles farther south in the Canadian Rockies.

As to the solid geology, the district explored lies entirely eastward of the Rocky Mountain Trench, that great structural feature which separates the Rocky Mountains proper from the diverse ranges of the central portions of British Columbia. The latter region is underlain by sedimentary and volcanic rocks of Palæozoic and Mesozoic age, with immense batholithic intrusions, ranging in age from pre-Carboniferous to Tertiary, and considered to have been the source of the metallic mineral deposits of central British Columbia.

In contrast, the ranges of the Rocky Mountains eastward of the Great Trench are a series of highly folded sediments with representatives of practically the whole geological succession, but without eruptive rocks, and devoid of ore deposits.

The Lloyd George Mountains are carved out of a great thickness of Palæozoic rocks, which are overfolded towards the east and often display in individual peaks the characteristic tilted fault-block type of structure and so-called 'writing desk' form, so prevalent elsewhere in the Canadian Rockies. Mainly composed of hard limestones, the softer interbedded shales and slates, with the softer limestone, are normally highly folded and sheared. No extensive overthrust masses (*nappes de recouvrement*) were observed. Compression and shear have been responsible for the destruction of almost all organic remains, and only in one locality high up in a mountain face was found a fossil coral horizon which appears to be of Silurian age. The field collection made by me has yet to be worked out.

Regarding the glacial geology, an outstanding discovery was a large stagnant glacier, lying in a deep canyon-like valley, which was entirely blanketed in moraine, and upon which trees and plants were growing. This glacier, extending through a range of altitudes of from 4,500 to 6,000 ft., appears to be the only one of its kind which is known south of Alaska.

The glaciers of the region generally appear to be in a state of slow recession. The present summer snow-line lies at approximately 7,900 ft.

The survey, and other scientific work of the Expedition, was greatly hampered by the prevailing bad weather, which, throughout the Rockies during the summer of 1947, was the worst on record for forty or more years.

[1] Willams, M. Y., *Trans. Roy. Soc. Can.*, **41**, (4), 73 (1947).

CAMBRIDGE ARCHÆOLOGICAL EXPEDITION TO CYRENAICA

By C. B. M. McBURNEY, R. W. HEY and W. WATSON

THE first Cambridge Archæological Expedition to Cyrenaica, North Africa, took place during the summer of 1947. A total of three months was spent in the field, and the following were the principal results obtained.

The primary object of the expedition was to investigate the Palæolithic succession in the coastal area, and to correlate it, if possible, with any traces that might be found of a marine Pleistocene succession. Italian geological literature of the pre-war period mentions the presence of marine Pleistocene deposits in the Benghazi plain, and refers to probable Pleistocene shore-lines at several points along the Cyrenaican coast. So far as we know, however, no detailed study of these was ever undertaken.

Accordingly, the first part of our time was spent in an examination of the more accessible portions of the coast between Benghazi and Derna, in order to locate beach conglomerates, wave-cut terraces and other traces of high level shore-lines. These were discovered in fair abundance, though obscured in many places by masses of alluvial material. From the results obtained by levelling such features, it is hoped to establish the Pleistocene succession of sea-levels for this part of the coast. The highest shore-line of which traces were found was at some 80 metres, in the Derna region ; the lowest lay at about 6 metres and was preserved in most of the areas examined. The intermediate levels are still under consideration.

The cultural succession associated with these events proved most instructive. Traces of the Middle Palæolithic could be recognized at various points along the coast, and a few specimens embedded in the beach conglomerates can probably also be attributed to the same stage. A rich Levallois station was discovered five miles west of Derna and can almost certainly be associated with the terra rossa at 5 metres above sea-level.